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Searching for the Next “60-Day Wonder”

My colleagues have ably described the demands of the military of the future. Let me draw your attention back to the demands of the present. With DARPA’s Rapid Reaction initiative, we don’t have the luxury of long timetables and far-off horizons. Our job is to deal with the here and now. We’re DARPA on the fast track, driving technology into the heart of battles that are unfolding today.

What we do, and how we do it, can be seen right now in Afghanistan and Iraq. In both theaters, one of the gravest dangers has come from small-arms fire at American military vehicles. Combat troops are being wounded or killed—unable to retaliate, unable at times to locate the enemy. Troops often pass through enemy fire without even knowing

there is a threat. Only afterward do they realize they have been shot at, when they discover bullet holes in their vehicle.

Answering this urgent need, DARPA’s Rapid Reaction initiative has developed Boomerang, a gunshot-detection system derived from a previous DARPA program. The challenge was to develop and deliver an on-the-move, vehicle-mounted system for detecting gunfire. The how it was done illustrates both DARPA and its contractors at their best: Within 30 days, the first prototype of the updated system was delivered. To meet the time constraints of the program, Boomerang was engineered in real-time. We spent about one-third of the time shooting at the system in the field. In



First generation of Boomerang in theater

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Updated Boomerang display

the morning, we tested the system at Quantico, drove 30 miles to Rosslyn to rewrite the software code, and then bring a new version back to the firing range the next day. Sixty-six days after a contract was signed, 50 Boomerang systems were delivered for deployment in Iraq.

As with other Rapid Reaction initiatives, Boomerang's success depended heavily on continuous feedback from Marines and Soldiers in the field. Drawing on their experience, we redesigned the visual display for the system. We switched to a simpler “o'clock” style so troops can tell if the shooter is at 6 o'clock or 2 o'clock. We needed an intuitive system that didn't require thought and analysis in the middle of a gunfight.

Boomerang illustrates the mission of Rapid Reaction. In the tasks given to us, we don't measure progress in months and years, we measure progress in weeks and days. We don't have the distant future waiting for us; we have troops in the field waiting on us. And today, in Iraq, Afghanistan, and elsewhere, the success of our work is truly a matter of life and death.

It was DARPA's director who conceived the Rapid Reaction initiative. About 2 years ago, he gathered some office directors, deputies, and program managers and laid out the new mandate. With American Soldiers deployed and fighting in Iraq

and Afghanistan, he said, we had to turn our minds to urgent needs of the hour. And partial solutions were better than no solutions at all.

Most DARPA efforts have program horizons of 3, 5, or even 10 years. For Rapid Reaction efforts, the goal is to deploy technologies within 60 to 90 days. We devise solutions, test without delay, reengineer as needed, and ship straight into the theater of conflict. As a former NASA engineer, I think of DARPA and Rapid Reaction this way: It is the difference between designing the Apollo program and bringing home Apollo 13. Drawing on all the knowledge, resourcefulness, and brilliance of the DARPA enterprise, our job is to handle the emergencies and, as the saying goes, failure is not an option.

In our Rapid Reaction efforts, technologies must be immediately scalable. For contractors ready to meet that standard, our greatest need right now is for new protection devices that can be fielded immediately and require little or no training to use. Speed, simplicity, adaptability, and economy—these are the elements of success. And when they all come together, it is impressive and inspiring.

Other offices at DARPA Tech will also discuss Rapid Reaction efforts: the Marine Airborne Re-Transmission System, the airborne beyond-line-of-sight radio-relay capability, the Water Pen purification system, and the Phraselator handheld translator device. For sheer speed in development, however, few programs compare with two systems: Gun Truck and Hard Wire.

Gun Truck was DARPA's answer to the roadside bombs planted by terrorists and other ballistic threats encountered in Iraq. American vehicles needed additional armor, but how do you do that in a matter of months? When a contractor came forward with Gun Truck, DARPA didn't say “Interesting concept, let's mull it over awhile.” We didn't tell the contractor to fill out forms and get in line. Dr. Tether's exact words at the time were, “Make it happen.” Under the direction of my colleague, Leo Christodoulou, we did exactly that.

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In less than 4 months, Gun Truck was ready, from an idea on paper to an operating system on the field in Iraq. Gun Truck is an entirely self-contained system applying existing materials (steel, fiberglass, ballistic glass) to protect the troops from improvised explosive devices (IEDs) and ballistic threats. It requires no training, includes all the tools needed to retro-fit convoy vehicles, and can armor a vehicle in under an hour. Thirty Gun Truck units are now in place. Thirty more, with upgrades drawn from after-action reports, are on the way. And if anyone doubts the good they have done, we need only listen to the testimony of a Soldier in the field who wrote to DARPA, “I was the driver of the 5-ton that was hit by the IED.

I just want to thank you guys for what you have done for me...I had six other Soldiers in the vehicle

at the time of the incident. All seven are breathing today because of you.”

Hard Wire, a system complementing Gun Truck, likewise shows how existing technology can be adapted rapidly to immediate warfighting needs. Hard Wire is designed to provide blast-resistant protective panels to military vehicles, using technology no more complicated than the steel belts of a radial tire. Steel wires—stronger than the cables supporting the Golden Gate Bridge—are inserted into composite material that can be shaped to any purpose, fitting most any vehicle structure or part. It uses well known manufacturing techniques that enable mass production and low cost. Hard Wire was developed and fielded in under 7 months, a dramatic example of resourceful contractors rising to the moment. It will be spiraled into the next generation of Gun Truck to further



5-ton truck equipped with Gun Truck after being hit by an Improvised Explosive Device (IED)

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improve ballistic performance while reducing weight and cost.

Essential to Rapid Reaction is an ability to see new possibilities in technologies that exist or are in development. We have to make connections that no one made before. We strive for simplicity, adaptability, speed, and economy. We expect this of ourselves, and we expect it of every contractor who joins the effort. We need your focus and energy. We need your creativity, your innovation, and your unrelenting commitment to the work at hand. Lots of remaining challenges could use your ideas:

- Our enemies rely on stealth, so we need your help with sensor systems to track the enemy’s movements over wide areas and in difficult environments.
- Our troops must carry heavy packs, for hours in harsh climates, so we need your help to lighten that burden and improve the mobility of our dismounted infantry.
- Combat in an urban terrain involves unique difficulties in communication, so we are seeking new technology that will enable non-line-of-sight communications in these environments.
- Confusion on the battlefield can end in some of the saddest tragedies of war, so we need

your help with new capabilities to distinguish friend from enemy in complex environments, without signaling our troops’ location to the enemy.

For some of the challenges, the solution may be found in the vast inventory of ideas, technologies, and weapons that have not yet found the right purpose. It may be a good idea that has never found its way from development into the operational inventory. It may be a technology that was devised for one purpose, but could be readily adapted to solve an immediate combat challenge. It may be different technologies whose combined power no one has yet discerned, two ideas that together will help our troops to detect and defeat an unconventional threat. Our job, and yours when you work with us, is to apply those concepts, discover those unseen applications, and make those vital connections.

In all of this, we need contractors equal to the challenges. We’re counting on your boundless skill and ingenuity. Come to us with your best people and ideas. Work with us in putting those ideas into action on the field of battle. You will find, as others have, that the demands are great, but when the day comes and your work is in the field protecting the lives of our men and women and advancing the cause of our country, you will find the rewards are even greater.